

Volatility is the square root of time and fat tails, a guest commentary

by Russ Certo

The trio of macro-prudential policy, the onset and evolution of shadow banking, and the nebulous concept of financial stability may have become a toxic cocktail which can be instrumental in moving forward the Federal Reserve's timeline for lift-off zero bound rates. The intuition here is steeped in concepts of volatility and how market structure evolution may contribute or detract from asset volatility. Please bear with me with the following pros.

Volatility is the square root of time.

- For price making a random walk, variance is proportional to time.
- Standard deviation is the square root of variance and therefore it is proportional to the square root of time.
- Volatility is standard deviation and therefore it is proportional to the square root of time.

$$\sqrt{t\sigma^2} = \sqrt{t}\sqrt{\sigma^2} = \sigma\sqrt{t}$$

In modern portfolio theory one standard deviation from the mean accounts for 68% confidence interval of all activity and observations within the mean distribution. Two standard deviations account for 95% of occurrences. Three standard deviations account for 99% of activity relative to the mean in a given probability outcome.

Fortunately or unfortunately, there are many asset price occurrences and events globally which occur outside the mean and with far greater frequency than typical option pricing theory suggests. Ironically, outlier events outside the mean can be sown by the seeds of persistent LACK of volatility. This can be a challenge in a zero interest rate policy world.

Annualized Standard Deviation

Unlike implied volatility - which belongs to option pricing theory and is a forward-looking estimate based on a market consensus - regular volatility looks backward. Specifically, it is the annualized standard deviation of historical returns. For the sake of bond trading there are approximately 252 trading days a year which is the time series used to derive daily volatility of interest rates. But these normal bell curve distributions have been repressed by vagaries of central bank policy.

There are limitations to capital asset pricing theory (CAPM) and one is that regular volatility looks BACKWARD. In fact, we know a few acquaintances that think typical option pricing theory is limited in its capacity and that FAT tails occur much more frequently than a normal distribution bell curve would suggest. To some there is a wall at the end of that fat tail with black swans perched atop in far greater frequency than option pricing theory academically suggests.

Allow me the license of some theoretical equations to serve for relevant discussion to markets and policy today. These are conceptual.

Financial repression times time equals volatility

Financial repression times time is an input to the inverse of financial stability

Macro-prudential policy times time is an input that can contribute to volatility

Macro-prudential policy times time+ financial repression times time equals volatility squared.

We all realize that during period of low volatility, market participants are incented to reach for alpha in a variety of expressions. Sometimes investors go down in credit quality to gain enhanced yield. Others execute buy-right strategies to augment performance whereby one owns an asset and writes a call on that asset to take in premium which enhances return. Others simply write naked options on assets. Some increase leverage or increase exposures to an asset class to achieve desired performance. Others simply become lulled to sleep and miss-allocate resources. So much for sharp ratios, a risk adjusted return, the average return earned in EXCESS of the risk-free rate per unit of VOLATILITY or TOTAL RISK.

These concepts of risk allocation or miss-allocation have historically led to consequent periods of great volatility spikes and deleveraging. The basic premise and inference here is that these bouts or tails occur at greater frequency than the inputs imbedded in our statistical pricing models.

These periods of selling volatility or miss-allocated resource absorption chasing alpha for performance enhancement and portfolio boosting can endure for EXTENDED periods of time. The classic unwinds of these allocations are of epic fare and proportion; tulip manias, alchemists, Mississippi Company, South Sea Company bubbles, modern prophecies, fortune-telling, great orators, dot.com bubbles, housing bubbles, Alt-A at par, national delusions, peculiar follies and other miss-guided exercises which tend to unravel at meteoric pace. Negative interest rates across large swaths of global rate structure come to mind at the moment. Buy volatility. *Extraordinary Popular Delusions and the Madness of Crowds*

http://books.google.com/books?id=xHsAgAAOBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.

What I would like to talk about is the marriage of three timely, prescient, and inter-related topics noted above which are encased with an understanding of how volatility can be catalyst: Macro-prudential policy, shadow banking formation and market structure and financial stability.

MACRO-PRUDENTIAL POLICY:

This is an all-encompassing topic and is defined by the IMF is “protecting the whole.” “Keeping individual financial institutions sound is not enough. A broader approach is needed to safeguard the financial system and mitigate risks to systemic stability. To reduce the cost to society and the economy from a *disruption in financial services* that underpin the workings of financial markets—such as the provision of credit, but also of insurance and payment and settlement services.” (FSB/IMF/BIS, 2009; IMF 2011a).

“**The failure of an individual institution can create systemic risk** when it impairs the ability of other institutions to continue to provide *financial services* to the economy. Usually only a large institution that is heavily connected to many other institutions can cause such spillovers

that its failure threatens systemic stability. These spillovers can occur through one or more of four channels of contagion:

- direct exposure of other financial institutions to the stricken institution;
- fire sales of assets by the stricken institution that cause the value of all similar assets to decline, forcing other institutions to take losses on the assets they hold;
- reliance of other financial institutions on the continued provision of financial services, such as credit, insurance, and payment services, by the stricken institution; and
- increases in funding costs and runs on other institutions in the wake of the failure of the systemic institution”

<http://www.imf.org/external/pubs/ft/fandd/basics/macropriu.htm>.

One could or should look at the pursuit of macro-prudential policy as a sort of parallel regulatory exercise of the likes of Glass-Steagall, which separated the activities of commercial and investment banks. Only the late macro-prudential regulatory arena isn't centrally legislated per se. In fact, it is decentralized regulation in a variety of forms.

One can broadly consider Basil III, Dodd Frank, risk based capital standards, haircut capital, leverage reduction, floating rate NAV money market reform, evolution of monetary tools tested and available at the Federal Reserve, litigation, stress tests, derivative and repo reform, central clearing houses and much more as representative of macro-prudential policy geared toward making the financial system safer by neutering a bevy of systemically relevant financial institutions.

Without validating or invalidating the integrity and effectiveness of such reforms, both explicit, implicit, and tacit capital, legal, and operative strictures have been placed on financial institutions intended to ring-fence a variety of real or perceived organizational behaviors which are deemed to put the greater financial system at risk. The collective and aggregate ring-fencing of **SYSTEMICALLY RELEVANT** institutions appears to have reduced some leverage, proprietary, and service aspects of banking and dealer models, and now asset manager, fund, and other capital company models.

Some specific examples follow along with a discussion of how these behaviors have altered the protocols in the financial market landscape. These “altered” protocols are ultimately passed along to clients in terms of various frictions of quality and quantity of service and price of service.

Primary Dealers/Banks/ & Boutique Financial Institutions: Some banks and financial intermediaries are charging clients for funding in a variety of capacities both in extension of balance sheet and in business protocols. Financing of client positions is prioritized with a business premium embedded in decision. In other instances, total dealer repurchase exposure has shrunk and is shrinking. Dealers are trading **LESS** volume in the over the counter and cash securities markets across multiple product lines. There is less balance sheet deployment and usage in secondary security positioning for house franchise or client service commitment. These are merely a few topical examples of adverse OR desired prudential impacts on intermediary models.

Further, there are additional facilities in the broad framework of macro-prudential arena that have been created, intended or not, which bypass traditional banking/dealer activities. For instance, the Federal

Reserve has tested and used in various capacities its overnight Reverse Repo Facility (RRP) and its Term Deposit Facility (TDF) which INCLUDES additional counterparties like asset managers and money market institutions which qualify based on capitalization, commitment and other factors.

This is a departure and augmentation of the traditional market piping of bi-lateral Open Market Operations with the Federal Reserve which were traditionally inclusive and unique to PRIMARY dealers. This decentralization of funding counterparties has also reduced the volume and impact of dealers in financing markets with clients as these facilities have been inclusive of other genre of management firms WHILE increasing the Federal Reserve as an active repo counterparty as a percentage of total counterparty exposure. These are tools which have effectively allowed for diminished total participation of traditional repo and financial dealing with traditional cadre of players which, in turn, is passed along the financial market food chain of diminishing utility.

In other arenas, the Bank of England estimated the impact on collateral markets of macro-prudential policy to exceed \$800 billion dollars. This was an estimate years ago but still evolving today which aspired to quantify how much of high quality assets would be required and applied for risk-based capital standards. The obvious storehouse asset of cash or marketable securities, U.S. Treasury securities, have compressed more than 50 basis points in market structure as a result of the implementation of these globally aligned reforms. I rhetorically ask, will this gobbling up of collateral for macro-prudential considerations spurn negative rates in U.S. money markets? I cuff envelope analysis and imperfectly suspect the collateral impacts of cumulative risk based capital requirements have and will exceed several trillion notional par value worldwide.

Not to stray from point, I think a very interesting linkage is that the collateral required for banks in macro-prudential regulatory reform HAPPENS to be held within global central banking balance sheets at the moment and is rolling into the front end of capital and money market curves. The Federal Reserve alone has approximately \$1.3 trillion in collateral scheduled to roll off or mature between early 2006 and 2022.

In other prudential related areas, actual and perceived litigation has likely impacted dealer's behavior in a variety of lending, trading, and commitment of balance sheet usage. The changing dynamic has increased the challenges of assigning INTELLECTUAL and CAPITAL resources to any specific strategic product line or business unit, which again, ultimately serves consumers/clients. Oh, the fun of assigning a return on equity to a business line for your reporting line (boss) and to dedicate resources across the product spectrum of distressed, emerging markets, Equities, HY, IG, ABS, MBS, Rates, Loans, FX, Commodities and more.

It may be a chore to allocate resources above in light of the dynamic of elevated asset prices globally due to central bank quantitative easing duly coupling your VAR decisions for asset growth across your products lines in the coming fiscal year? What rate of growth would YOU assign to those businesses and then how would you respectively allocate your precious capital which is definitely shrinking and yet not possibly known?

Perception of increased organization friction increases perception of RISK of allocating resources and to real risk management with increasingly scarce vision of firm capital and cost of capital. Some managers don't know what their capital allocation is due to revolving and evolving litigation and reform. Firm total capital and makeup literally are evolving in a regulatory and litigious continuum. A moving target.

Volatility is the square root of time. The more time that elapses in a zero interest rate climate puts greater pressure on an array of relevant factors affecting bank's behavior including declining net interest margins, compensation scheme challenges for critical employees, retention of intellectual capital and skill sets, and mobilization of firm resources to compete and dynamically changing operating and market environment.

SHADOW BANKING

Why is this important? This is important because financial activity like liquidity provisioning and service to the global investment community is increasingly occurring outside the banking system. In fact, a web of non-dealer/non-bank financial institutions are getting caught up in the school of systemically relevant institutions and, hence, increasingly under the macro-prudential regulatory reform umbrella. To point and without analyzing in detail, look at GE's decision to rid more than \$150 billion in financial, housing, loan, security, and mortgage assets partially due to the stigma of prudential regulation and associated adverse capital impacts, as the moniker of systemically relevant was specifically stated as a consideration in the re-organization. Also, extrapolate that the prospective sale of such assets may also continue to fall OUTSIDE the traditional financing, dealing, and market service players of prudentially regulated landscape.

The BIS supported this notion with a recent working-paper called "Global dollar credit: links to US monetary policy and leverage." This paper's main points are that U.S. monetary policy is transmitted DIRECTLY to the rest of the world and limits national policies. The fastest growth of U.S. dollar credit, the objective of the Federal Reserve in monetary multiplier concepts, is IN BOND ISSUANCE of non-financial non domestic issuers abroad. This credit growth OUTSIDE the typical monetary transmission mechanism of U.S. banking institutions is close to \$8 trillion dollars and is prone to reversals of non-financial issuer and sovereign credit risk and interest rate rollover risk of securitized funding. The paper concludes that the genesis of policy, linkages to central bank policy, has created these FINANCIAL STABILITY concerns. <http://www.bis.org/publ/work483.pdf>.

My favorite flowchart in the piece is page 6 which demonstrates the diminished role of banks in dollar credit expansion. Many investment managers have pondered where are the possible unintended consequences of credit creation lurking and miss-allocated around the world? I think this paper sheds light on where and what the implications are. I would add that this concept may also partially explain why MONETARY VELOCITY has plunged despite central bank quantitative easing policies, the bank transmission mechanism is pushing on a string versus where the liquidity is currently store housed, overseas and outside banks.

The new pod of \$8 trillion dollar liquidity mechanism is in corporate bond issuance in non-finance companies and held by ASSET MANAGERS. This is the linking of macro-prudential policy which is pushing the functionality of traditional market service, credit creation and financial market service outside the traditional realm of banking. For reference, \$8 trillion dollars is more than twice the size of the entire money market fund business in the United States.

To complement the discussion above with some examples, there has been considerable discussion about exit fees with fund families to mitigate risk within active and passively managed fund community. There has been plenty of colorful debate regarding the relevance of asset manager's liquidity to the overall marketplace. This debate has become so relevant, even contested, that it has even been acknowledged or validated by a Federal Reserve Bank of New York Staff Report titled, "Gates, Fees, and Preemptive Runs." http://www.newyorkfed.org/research/staff_reports/sr670.pdf.

The preliminary findings noted in the abstract are: “We build a model of a financial intermediary and show that allowing the intermediary to impose redemption fees or gates in a crisis—a form of suspension of convertibility—can lead to preemptive runs.”

Why is this important? This is important as in an unforeseen period of asset or market volatility, traditional market structure has evolved in light of the macro-prudential observations above. The liquidity function and ability to transact and execute investment philosophies could be compromised with the evolution of where liquidity is STORED. Increasingly, the financial press has aspired to qualify where risks may now lie within the fund community and products that are being offered to institutional and retail investors alike.

Varied discussion on the topic includes whether proper product disclaimers are being used in the marketing of new fund products like ETFs? Are some products being exploited as a cash equivalent under the perception of offering a liquidity advantage to cash securitized issues, products, markets, and service? Is there a “cross-shareholding” of other fund family assets held WITHIN funds, a leverage component so to speak? Can products accurately replicate the performance of the underlying assets? Does an unconstrained nature of new product design and financial engineering create “performance chasing?” Is there a first mover liquidity advantage of assets portfolio arbitrage relative to NAV? Is there an inter-relationship between indexing and the storehouse in these products. Can volatility in the fund arena reverse impact the asset volatility of the underlying financial security instruments? Can everyone get out in time?

FINANCIAL STABILITY

The IMF just published a White Paper titled “Shadow Banking Around the Globe: How Large, and How Risky.” This paper describes the growth and risks of and regulatory responses to shadow banking—financial intermediaries or activities involved in credit intermediation outside the regular banking system, and, therefore, lacking a formal safety net!

I find timing and nature of this paper to be significant for a variety of reasons. First, the IMF infers that prudential regulation have made the financial system MORE unstable despite containing systemically relevant banking institutions. Control the parts at the expense of the whole per se, the ironic opposite of the definition of macro-prudential regulation.

Further, I find the IMF to be traditionally ALIGNED with the central banking, policy, and regulatory circles. Therefore, this is quite the empirical work of DEPARTURE from many post-crises regulatory developments. This has generally been a liberal policy body which is decidedly bucking traditionally liberally aligned prudential principals at the current moment.

Moreover, the timing and nature of the work sends a shot across the bow possibly in the MONETARY and regulatory policy community due to perceived imbalances that may exist within the realm of FINANCIAL STABILITY. <http://www.imf.org/external/pubs/ft/gfsr/2014/02/pdf/c2.pdf>.

Why is the linkage of MACRO-PRUDENTIAL policies pushing traditional behavior outside the banking system and dealing community while simultaneously diminishing traditional intermediary bank/dealer incentives to serve global securities market important? This is because by altering the traditional market transmission mechanism of bank and market liquidity to other areas possibly encumbers the traditional monetary mechanism which appears to be adversely impacting monetary velocity due to meandering global liquidity movement into the SHADOW BANNKING SYSTEM.

What are the implications of the newfound and evolved shadow banking framework, systemically identified or not, with the creation of new fund products as pertained to market infra-structure, liquidity, and market profile important? Will the liquidity function hold up in case of wholesale asset sales or fund redemptions? Has the liquidity function been tested and what are the implications for market liquidity? What are some possible near term implications for policy makers regarding FINANCIAL STABILITY?

POSSIBLE MONETARY POLICY IMPACTS

I suspect the concept of financial stability has the potential to be a mover in the monetary policy framework at the moment. The Federal Reserve, and other quasi bank and policy bodies, appears to increasingly be focusing on the concept of financial stability.

A BIS working paper defines financial stability as the following: “Financial stability is difficult to define and even more difficult to measure. Strictly speaking, a financial system can be characterized as stable in the absence of excessive volatility, stress or crises.” <http://www.bis.org/ifc/publ/ifcb31ab.pdf>.

In a theoretical world, market critics often refer to “the Greenspan put”, “Bernanke put”, the “Yellen put”, the “plunge protection team” and other monikers for the perceived desire for central bankers and other policy bodies to engage in market stabilizing activities, WHATEVER they may be.

In the broad notion to restore order in the post credit crises world we have witnessed many schemes which generally fall into categorical definition of financial repression schemes or monetary policy devices and other policy devices geared towards stabilizing markets mostly in the stated pursuit of price stability, stable employment, moderate interest rates and other economic or social variables.

Most policies align themselves with LOWER volatility outcomes and better economic tidings for the middle class, society at large or global economy alike. Financial repression schemes of negative real interest rates, or ZIRP, quantitative easings, even crude no short rules of times past, and many other interventions, bail outs etc. were geared towards asset stabilization, with the sole exception of currency markets. An assumption here is monetary policy, other than twin mandates, has also been engineered to manifest stability and generally lower asset market volatility.

In market and policy circles it is being debated that the overwhelming and varied onslaught of monetary accommodation has reasonably achieved “financial stability” as defined by the BIS above. Recall, the BIS (Bank of International Settlements) is the central bank of the central banks, so, their thoughts are important in the central banking arena.

Recent references to financial stability concerns along with recent working papers by quasi bank and regulatory bodies, coupled with decentralized, varied, and even conflicting comments from central bank speaking engagements may posit that there is an uneasy feeling within the policy community regarding certain market incentives created by central banks. The concerns are that quantitative easing, and lengthy liquidity provisioning have encouraged investors globally to reach for alpha, sell volatility, increase leverage, miss-allocate investment capital, and generate a self-imposed central bank induced financial stability artificiality of investment valuation imbalance in the world’s financial markets. This seems to be a significant change of heart given the policies which were instrumental in affecting global investor behavior. However, times and policies change.

I equate the narrative as one of controlling an avalanche by detonating the technical so the outdoor alpine sportsman, doesn’t fall victim to uncontrollable landslide. Central bankers appear to speak of both sides of hawkish/dovish tongues recently as warning signals to those engaged in the pursuit of excess

return vis a vis excessive leverage and risk allocation. This tongue and check communication style I think is suited to bankers that aspire to temper notions of financial stability. To me, a sea change seems to have occurred either in political or monetary policy community where proactive communication is now the order of the day. For these reasons I think there is asymmetric policy risk with the Federal Reserve in moving forward its liftoff and I believe this week we have witnessed a coordinated protocol with other central bankers.

Collectively, conflicting but revealing reference to financial stability in domestic policy speeches, uniquely timed and nature of working papers on market structure, liquidity, shadow banking risks, and financial stability, the possibility of increased mouthpiece financial disclaimers within press corps on liquidity and fund risks.

Overseas, Of course, on Friday China raised red flag on its stock markets as China regulator warned small investors, raising fears of a market selloff that cause ripples across the globe. China tightened rules on margin lending as the main market index has doubled over 12 months and the riskiest index is up 70% this year.

The China Securities Regulatory Commission warned small investors not to borrow money or sell property to buy stocks as mainland investors opened stock trading accounts at the fastest pace ever in the week ended April 10, and margin account balances reached a record 1.16 trillion yuan as of Thursday. Further, the regulator banned a type of financing called umbrella trusts that provided cash for margin trading. CSRC also warned that limits may be placed on trading for small investors.
<http://www.wsj.com/articles/china-raises-red-flag-on-its-stock-markets-1429274641>.

In another example yesterday, this time in England, The BOE is the first central bank to consider a pickup in inflation may not be gradual in their Minutes of the Monetary Policy Committee, from April 8 & 9. <http://www.bankofengland.co.uk/publications/minutes/pages/mpc/default.aspx>.

I also noticed that Canadian core inflation was the fastest in 6 years. This morning there was a Bloomberg article which noted that Euro-Area swaps show faith in Draghi as 5 year inflation swaps have risen meaningfully other break even's in Germany and U.S. have also responded in kind.

To revert to the beginning of this newsletter;

Volatility is the square root of time. Financial repression times time equals volatility. Financial repression and/or macro-prudential policy times time equals the inverse of financial stability. Financial stability inverted equals volatility squared.

And one to part with, "Financial Stability is the one variable that could change the impetus for the Federal Reserve to have conviction to lift the floor of rates sooner than later.

This, my friends, finds the Eurodollar complex longest in a year and coming from a 2016 legacy lift-off guy. We'll see soon enough. Good luck.

Best,

Russ